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PUBLIC SERVICE STATISTICS IN THE UNITED STATES.*

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In discussing the development of public service statistics in the United States, I purpose, first, to describe the growth of such statistics in the United States and their status and extent at the present time; second, to discuss the defects that seem to stand out most prominently; finally, to suggest what function, if any, the American Statistical Association and its members may have in the work of remedy and improvement.

Turning first to the definition of *public service*, in its broadest application it comprises all activity that has within it the nature or aspect of a public calling. In this aspect any corporation catering to the public is a public service corporation, as a manufacturing company, or a trading company, or a corporation engaged in commerce or finance. In a narrower application the public service category covers the efforts of all individuals or corporations serving the public in a general capacity, as for example a horse doctor, a smith, an innkeeper, a public entertainer, a theatrical company, or a warehouse corporation. In the generally accepted but limited aspect, however, the term "public service" covers the activities of corporations that furnish the general public with a widely distributed and necessary utility, such as transportation, communication, heat, light, power, and water. Under this heading come steam and electric railway companies; marine navigation and canal companies; express, telegraph, and telephone companies; and so-called public utility companies.

Public service statistics may be defined as the statistical facts concerning (1) corporations engaged in public service

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and (2) their activities. They relate especially to number of companies, the extent of their operations, and the physical and financial results of operation.

Public service statistics are compiled and published by various agencies in the United States. The federal government has for years collected and disseminated statistics of many kinds. Recently there has been marked activity by the several states, through public service or utility commissions, bureaus of statistics, labor bureaus, and various other state institutions. Statistics are also gathered at the present time by a number of large cities through various departments.

In addition, many private organizations are engaged in the collection and tabulation of public service statistics. Among these are associations of corporations engaged in public service, such as the American Railway Association and the Bureau of Railway Economics among the steam railways, the American Electric Railway Association and the Massachusetts Street Railway Association among the electric railways, the National Electric Light Association, the Public Service Association of Virginia, and so on. Finally we have statistics promulgated by corporations themselves engaged in public service, in the form of annual reports to regulating bodies, periodical reports to stockholders, or communications to the general public.

Steam railway construction in the United States commenced with the Baltimore & Ohio Railroad. The first statistical table relating to railway operation in this country was contained in the first annual report of the Board of Engineers of that railway, dated September 30, 1828, which presented in tabular form an "approximate estimate of expenditures incident to the service" of the Baltimore & Ohio during the year ended August 31, 1829. The Baltimore & Ohio Railroad and other roads as they came into being have from the beginning made annual reports to their stockholders, containing more or less statistical matter.

The first attempt by public authority to gather steam railway statistics in the United States was in the state of Massachusetts, which in 1836 required "the directors of every such

(railroad) corporation, from year to year, to make report to the legislature, under oath, of their acts and doings, receipts and expenditures, under the provisions of their charter." A later Massachusetts statute of 1846 specified the items to be covered by the railways in their returns, among which were returns of casualties.

I have examined Massachusetts Senate Document 49 for 1836, containing the annual reports of five railways for 1835. The series is headed by the report of the Andover and Wilmington Railroad Corporation, giving merely the amounts received and expended during the year. The reports of other roads are hardly more detailed.

Massachusetts was closely followed by New York, where a resolution of the Assembly in 1843 directed the several railroad companies of that state to furnish the secretary of state certain statistical information each year. This was tabulated by the secretary of state and submitted annually to the Assembly in pamphlet form. Assembly Document No. 129, for example, dated March 1, 1845, presents statistics for fifteen of the twenty railways of the state, covering the operations of the year 1844, and gives the following statistics: mileage, cost of construction, maintenance expenses, freight and passenger receipts, dividends, horses and equipment, machine shops, freight and passenger train miles, passengers carried, and in most cases statistics of employees.

Other states, especially in New England, also made early provision for the collection of railway statistics, but not until the creation of the first state railway commission was the field of public service statistics really covered. While Rhode Island had a so-called railroad commissioner as early as 1844, the first railroad commission was created in New Hampshire in that year, a body of general railroad commissioners in Connecticut in 1853, boards of railroad commissioners in New York and Vermont in 1855, and a railroad commission in Maine in 1858, followed by Massachusetts in 1869 and Illinois in 1871. In fact, prior to the passage of the federal interstate commerce act of 1887, a majority of the states had established regulative or advisory railway boards or offices. At the present time only three states—Delaware, Utah, and Wyoming—have no rail-

way, public service, or corporation commission with jurisdiction in some form over railways.

Statistical work has been carried on by the federal government from its very establishment, the earliest effort being centered on decennial censuses. An act of 1820 provided for the collection of commercial statistics, and also of the amount or tonnage of *navigation employed in foreign trade*. This was the first provision for public service statistics in the United States.

The Federal Bureau of Statistics came into existence in 1844 in the shape of a group of clerks in the Treasury Department assigned to purely statistical compilation. The entry of the federal government into the field of railway statistics was, however, relatively late. The general appropriation act of 1875 created a division of internal commerce in the Bureau of Statistics, and provided that this division should, among other things, compile "statistics and facts relative to . . . the railroad systems of this and other countries, the construction and operation of railroads, the actual cost of such construction and operation of railroads, the actual cost of transporting freight and passengers on railroads and on canals, rivers, and other navigable waters of the United States, the charge imposed for such transportation of the freight and passengers, and the tonnage transported."

This division of internal commerce of the Bureau of Statistics, in its first report, June 30, 1876, described the principal trunk railroads of the country and presented a few transportation statistics. In 1878 there was created the office of auditor of railroad accounts in the Interior Department, later called the commissioner of railroads, whose duties were to prescribe a system of reports from all railways receiving aid from the government. The second report of the auditor, published in 1880, contained a statement of the condition of the Pacific railroads, statistics of railway accidents, and a comparison of certain railways for 1878 and 1879. Later reports contained also statistics of railway construction and development, and of railway indebtedness.

The act to regulate commerce was approved February 4, 1887. The important section of the act, so far as the collec-

tion of statistics is concerned, authorized the Interstate Commerce Commission to require annual reports from common carriers containing statistics of capital stock, dividends, surplus, stockholders, funded debt and interest, cost and value of railway property, franchises and equipment, amounts expended for improvements and the character of such improvements, employees and their salaries, earnings and receipts, operating and other expenses, profit and loss, and a complete exhibit of financial operations each year, including an annual balance sheet. The act further authorized the Commission within its discretion to prescribe a uniform system of railway accounts.

This section, amplified in many details, remains today the authorization upon which the Commission bases its system of uniform accounts and detailed statistical reports from the carriers. Additional legislation has strengthened the hands of the Commission in enforcing its accounting and statistical regulations, exacting penalties for non-compliance, and exercising strict supervision by means of a corps of special examiners.

The first statistical report of the Interstate Commerce Commission appeared as a part of its annual report, and covered the operations of the railways of the United States for the fiscal year ended June 30, 1888. Since then the annual statistical reports of the Commission have grown in size and detail, and are now, in bulky volumes of seven or eight hundred pages, important source-books for the student of transportation problems. The statistical field covered in these reports has been considerably broadened to cover the detailed accounting practices of the railways, intercorporate relationships, extensions and improvements of property, balance sheet details, traffic, and many other features.

In addition, the Commission issues monthly statements of railway revenues and expenses, quarterly statistics of accidents, annual returns of the express and sleeping car industries, and periodical statistics as to safety appliances, boiler defects, hours of service, and the like.

The reports required by state railway commissions from the railways operating in their territory are similar to the reports required by the Interstate Commerce Commission from the

same roads. In fact, the Interstate Commerce Commission for some time has furnished many of the state commissions blank report forms into which the railways of the several states shall transcribe their returns for such commissions. Three fourths of the state commissions are so supplied at the present time. These report forms correspond to the report form of the Interstate Commerce Commission itself, except that the pages designed for entries regarding mileage, improvement of physical property, revenues and expenses, taxes, and traffic are adapted to show the conditions in each respective state. Certain items not distributable according to states are exactly the same for all forms. From the point of view of the railways concerned, it is highly advantageous that the report forms of the Interstate Commerce Commission and the various state commissions are practically uniform. Imagine such a railway system as the Santa Fe, which operates through twelve different states, being required to maintain its operating statistics according to twelve different accounting systems, in addition to the uniform system imposed by the federal commission. From the point of view of the student of general railway statistics, however, this coöperation between state and federal commissions is of little interest, for the important and significant annual returns of capital, income, balance sheet items and the like, made by a railway to the federal commission, will be found repeated practically without change in the statistical reports of as many states as are entered by the lines of that railway. The result is that the reports of the several state railway commissions, however valuable they may be from the regulative point of view, throw little new light upon the intrastate operations of railway companies. There are, however, exceptions to this rule, such as the reports of the Illinois, New York, Texas, and Wisconsin state commissions.

From the beginning, railway corporations have submitted periodical reports to their stockholders. The earliest was the report of the president of the Baltimore & Ohio Railroad, dated October 1, 1827, which was nothing more than an indefinite four-page prospectus of the plans of the company. Since then the reports of this and other railway companies have

grown continually in scope and detail. With the development of a uniform accounting system by the Interstate Commerce Commission, the reports of the steam railways to their stockholders have tended more and more toward uniformity, comparability with past years, and clarity of statistical presentation. There is no question that this system of uniform accounting has greatly improved the privately compiled statistics of steam railways in this country. When it is noted that the railway mileage of the United States is greater than the aggregate railway mileage of the continent of Europe, the significance of the last remark will be clear, for to survey the operations of 250,000 miles of railway with anything like clear vision requires uniformity of statistics throughout.

In addition, the larger railways often prepare and issue general statements for public consumption, many of which are statistical in nature. These statements, like the annual reports of the companies, are prepared for the most part in well-equipped statistical offices, which are maintained by many of the principal railways. These offices are of great service also to the officials of their respective railways, preparing statistical memoranda that shall enable them to keep in touch with the details of current operation.

Furthermore, the American Railway Association and other coöperative associations do considerable statistical work, while it is becoming increasingly the custom for the railways to coöperate on a large scale in the preparation of statistical exhibits for presentation in wage arbitrations, rate cases, and the like. Recent examples of this coöperation have recently occurred in the Five Per Cent. case of the Eastern railways, and in the wage arbitration of the Western railways and their enginemen and firemen.

The first commercial electric railway in the United States was opened for operation in 1881. From no mileage in 1881 to nearly 50,000 miles in 1915 is a quicker growth than was shown by the first third of a century of steam railway construction. Because the new electric mileage of these thirty years has been burdened with denser traffic than the steam railways from 1830 to 1860, and because electric railways have doubled

their mileage in the past ten years, it is not strange that electric railway statistics have developed with relative slowness. Not until 1906, indeed, was the Interstate Commerce Commission given authority to collect statistics of electric railway operation. The Commission first requested reports from the electric railways for the fiscal year ending June 30, 1908, but no compilation of returns has yet been made. Even if it had been, such a report would not cover one third of the perhaps 1,600 electric railway companies operating today, and probably not half of the aggregate mileage; for the Commission has jurisdiction only over lines participating in some form of interstate traffic, and many municipal systems do not come under this head. In fact, in a recent case before the Interstate Commerce Commission, an electric railway company disclaimed the obligation to report accidents occurring in the course of intrastate operation, although willing to report accidents in interstate operation. If the steam railways were to make the same disclaimer, and refuse to report any but interstate accidents, it is clear that accident statistics would be much impaired.

Since electric railway statistics are not compiled by the Interstate Commerce Commission, it is well that the Census Bureau has since 1890 published reports on street and electric railway transportation. The latest such report covered the calendar year 1912.

More than half the state public service commissions have unqualified authority over electric railways within their state boundaries. Six or eight other state commissions have qualified regulative power, applicable only to interurban roads or roads lying outside the principal cities. The annual reports secured by state commissions from electric railways, as in the case of steam railways, are based largely upon the report form of the Interstate Commerce Commission. Half the states utilize this report form with the necessary modifications, and the tendency toward uniformity in electric as in steam railway statistics is growing.

The Eleventh Census, 1890, presented the first report upon the express business of the United States. Like the electric railways, express companies were placed by the Hepburn Act

of 1906 under the complete jurisdiction of the Interstate Commerce Commission. These companies make periodical reports to the Commission, which has compiled and published statistics of the twelve principal companies annually for several years.

In addition, the principal companies have been investigated by the Commission; these investigations have gone to the heart of the express business, have ascertained the value of express property, have unearthed the relations between express companies and railways, and have led to drastic changes in express rates and regulations.

These changes, together with the growth of the parcel post system and other business changes, have already led one company to withdraw from business, and have affected the profitable operation of the others. Clearly, statistics of the express business under these conditions, while interesting, are not of paramount social significance. Yet about three fifths of the state commissions require reports from the express companies operating within their boundaries, and are using the report form of the Interstate Commerce Commission, modified to suit their respective needs. A considerable number of these states publish annual statistics of express companies.

Marine transportation in the United States is so largely an interstate matter that the collection of marine statistics has been left in large measure to federal authority.

We have already seen that in 1820 an act of Congress provided for the compilation of statistics of navigation in foreign commerce. The census reports of 1850 to 1890 covered canals and improved waterways, and a special census of 1906 dealt with vessels engaged in water transportation, tonnage, income, freight and passengers, and employees and wages. More recently, the Bureau of Corporations has been issuing a series of reports dealing with water routes, volume of traffic, terminals, and form of control. The Board of United States Engineers publishes annual statistics of freight tonnage on the improved rivers and canals, but these are not summarized.

In addition, a few states compile statistics of steamboat

and canal traffic, such as the Erie Canal traffic in New York, but students of waterborne traffic will agree with the statement that these statistics are far from satisfactory or complete.

In fact, there has been nothing in the field of marine statistics to compare with the uniform and detailed railway statistics filed annually with the Interstate Commerce Commission and with the several state commissions. Beginning with the calendar year 1914, however, the Commission has ordered carriers by water with annual revenues above \$500,000 to file detailed annual reports.

The telegraph is an older institution than the electric railway, but has not been regarded to the same extent as a public service, and only recently has the telegraph field been entered for regulative purposes by the federal and the state governments. The amendments of 1910 to the interstate commerce act, commonly known as the Mann-Elkins law, gave the Interstate Commerce Commission jurisdiction over telegraph and telephone, wireless and cable companies. Under this act the Commission may require reports from the telegraph companies, of which there are two large and a dozen small ones at the present time. No such reports have as yet been made to the Commission. Similarly, no reports are now filed by cable or wireless companies.

It is estimated that 11,000 telephone companies operate in the United States, exclusive of farmers' lines. These companies own approximately 10,000,000 residence and business telephones, or one for every two families throughout the country. Statistics of telephone operations would not only be extensive, therefore, but should be significant and interesting. The Interstate Commerce Commission was granted jurisdiction over telephone companies in 1910, and has recently issued orders to large companies, with annual revenues above \$250,000, to file reports beginning with the calendar year 1914. Not more than three fourths of the 11,000 companies have interstate connections, and a very small proportion of these do sufficient business to come under the requirement of the Commission.

The Census Bureau has published special reports on tele-

phones and telegraphs covering three years—1902, 1907, and 1912. These statistics the Bureau placed in comparison with statistics collected in the census of 1880. The latest bulletin on the subject covers practically all the telegraph and telephone companies of the United States.

The field of telegraph and telephone statistics has also been entered by several states, about twenty of which publish periodical statistics thereof, and by the private organizations of the companies themselves.

Since 1910 the Interstate Commerce Commission has required annual reports from the Pullman Company. With the exception of pipe lines and sleeping car companies, whose operations are almost exclusively interstate, other forms of public service are mainly local, such as the operations of gas and electric light plants, power plants, heating systems, water companies, and the like. These industries are in part covered by the Census Bureau in its reports of manufactures and the electrical industries, and in its statistics of cities; in part by the reports of about twenty state public service or utility commissions; and in part by municipal reports.

It were idle to attempt detailed appraisal of public service statistics within the limits of this brief paper. I will merely suggest a few general criticisms of federal, state, and private statistics. Before entering on this, however, it may be well to point out that public service statistics, like all other statistics, should be judged on the basis of serviceability. If statistics do not assist in solving the many problems of today, if they befuddle the brain instead of stating simple truths, they were better not compiled.

The earliest and most consistent complaints of federal statistics were directed primarily against their inaccuracy. For example, the results of the First Census of 1790 were regarded by many with skepticism, and complaints of error were leveled at all the censuses to 1850. Similarly, the earlier work of the Bureau of Statistics, which in the field of railway statistics was the predecessor of the Interstate Commerce Commission, was subjected to much criticism on the ground

of error. A commission of investigation reporting on that Bureau in 1877 called its work "so grossly and grotesquely inaccurate as to make the bureau an object of ridicule."

The progress of statistics has been so marked in the past forty years that the same criticism would not apply today to public service statistics as a whole. Yet into the statistical reports of federal and state commissions there creep, even in these latter years of grace, errors of omission and commission. It would be odious to give concrete examples without covering the field in detail, but it is not unfair to remark that the reports of the Interstate Commerce Commission are relatively free from error, when compared with the reports of the average state commission.* An extensive survey of the official railway statistics of foreign countries leads to the further remark that American reports average as high in this regard as most foreign reports. Whatever the results here or abroad, the underlying cause of the errors is carelessness at some point. And as the ultimate goal of statistical work is to present facts, public service statistics cannot be regarded with complacence till inaccuracy shall have been reduced to a minimum.

Another oft-repeated complaint against government statistics protests the delays attendant upon their preparation and publication. The commission of 1877 on the Bureau of Statistics, for example, strongly recommended increasing the timeliness of the reports of that Bureau. That same recommendation could be repeated with emphasis regarding the

*It is not unfair to cite the following from the Annual Report of the Public Utilities Commission of Rhode Island for 1913, pp. 92-93, as a gross form of error.

PASSENGER TRAFFIC.		
	Average distance carried.	Average receipts per passenger per mile.
Road A.	18.50	\$.01737
Road B.	5.53	.04033
Road C.	2.00	.01841
Total.	26.03	\$.07611
FREIGHT TRAFFIC.		
	Average distance of haul of one ton in miles.	Average receipts per ton per mile.
Road A.	96.43	\$.01345
Road B.	4.94	.12812
Road C.	2.00	.01445
Total.	103.37	\$.15602

Truly, the *addition* of these averages to reach a general average should make the shades of the early New England statisticians start up with a groan!

statistical reports of practically all public service bodies of today. The compilation of statistics gathered from many sources is a slow and tedious process; yet this need not deter complaint when reports are unduly delayed in appearance. When a report on steam railway operations is issued annually, it does not seem unreasonable to expect the issue for a given year to appear before the close of the next succeeding year. Yet such reports have in recent years been delayed eighteen, twenty, and even twenty-five months after the close of the fiscal year to which they applied. So far as the Interstate Commerce Commission is concerned, the improvement in this regard has been notable, and especially in the matter of monthly statements of revenues and expenses, which have continually tended toward currency. Privately compiled statistics of public service also approximate a fair degree of timeliness, but the statistical reports of state commissions are sometimes much delayed. The vital connection between promptness and serviceability in the field of public service statistics hardly needs emphasis, and one has only to consider the close relation between the transportation industry and business in general to realize how important is the current statistical record of that transcendent industry. In this matter of timeliness, we may take Pharisaic satisfaction in that we are no more dilatory than many foreign statistical offices, but when we consider how delayed their reports occasionally are, our satisfaction cannot be great. The official statistics of French railways for the year ended December 31, 1911, for example, were not released till the end of 1913, or two years late; while other countries are at times even more behind-hand.

Still another general criticism, closely related to that of inaccuracy, relates to insufficient clearness. Reports lose greatly in effectiveness when their tables are poorly constructed, insufficiently introduced and explained, or carelessly entitled. An ambiguous title over a table is hardly better than no title at all; a table thrown into a report with little or no explanation of its source, its underlying bases, its scope, or its qualifications, is of distinctly less utility than no table at all. Discrepancies among tables should be invariably explained. Furthermore,

a table whose steps are hard to follow, or the significance of whose contents you must stand on your head to appreciate, may be better than nothing, but this the exasperated student is sometimes tempted to deny. To clarify is to simplify, nine times in ten; and there is no more cheerful handmaiden to serviceability than simplicity.

There is room for difference of opinion as to whether interpretative text should accompany statistical tables or not, but if included at all the text should be clear, unambiguous, and sufficient. The parrot-like textual comment that stalks so often through the pages of our public service reports, being repeated page after page in the same report, or year after year in the same series of reports, should be eliminated. It adds nothing to the utility of tabular matter, but tends rather to conceal the salient features of the different tables. The suspicion steals across the brain that this kind of text is prepared either by a statistician who has much to learn, or else is entrusted to junior clerks to be ground out at the rate of so many paragraphs per hour. Few of the reports of our public service commissions are wholly free from this worse than useless custom.

The problem of coördinating the statistical reports of the various branches of the federal government happily does not exist, so far as public service statistics are concerned; for these statistics are entrusted largely to one federal body, the Interstate Commerce Commission, and even where this is not the case, the spirit of coördination and coöperation has been marked. Recent examples are the coöperative efforts of the Commission and the Census Bureau in ascertaining the physical value of railway operating property and in compiling statistics of express companies.

Finally, this comment upon the weaknesses of public service statistics in the United States would be incomplete unless it registered a vigorous protest against the custom, so prevalent in many reports, of presenting countless pages of detailed tabular matter without adequate summaries or logical arrangement. In some cases, even, no attempt is made at tabular presentation. Nine tenths of the expenditure underlying statistical work that sees the light in such form has been

wasted, yet some state commissions publish reams of statistics of this nature every year.* These same commissions usually add to their other statistical vices that of trying to give too much information, with the result that their reports are not only badly arranged, but contain much data of little value. This is a waste of time and money, and greatly contributes to unintelligibility.

We have seen how the development of public service statistics of all kinds has proceeded during the past few decades, and have briefly reviewed the present situation. Is the statistical work now under way worth the energy and the millions of expenditure it involves, should it be added to and increased, or is it rather the wise thing to curtail it?

In this connection, I wonder if students of modern social problems do not sometimes feel themselves in the position of the boy in the legend who took on board ship a mill which upon the repetition of certain magic words would commence grinding salt. The boy uttered the words and the mill started grinding, but when he desired to stop the mill, he found he lacked the necessary formula. In spite of efforts, the mill continued to grind salt until it sank the ship to the bottom of the sea. Legislatures and statisticians have in the past been winding up the mills that grind out year after year countless statistics of the public service. Are we not inclined at times to feel that we have lost the formula for stopping the mills?

However this may be, I think few students believe, and possibly still fewer hope, that public service statistics should be collected and compiled in any less detail than at the present time. Indeed, the majority would doubtless assert that the commanding need is for greater detail, especially in the way of uniform accounting methods, cost accounting systems, statistics of corporate relationship, and the physical statistics of operation. Into this discussion of the lines along which statistics of public service should or will develop, it is not the function of this paper to enter.

* Thus the seventh annual report of the Railroad Commission of Oregon, December 15, 1913, contains over eighty pages (pp. 155-237) of closely printed statistical matter presented almost wholly in running text, without tabular arrangement.

Indicating in this general way that public service statistics are likely to increase in detail and in complexity, the next question relates to the functions of this Association with regard to such growth. Should we as a body take formal steps to influence the development of public service statistics along any lines? The American Statistical Association has in the past taken such action. For example, in 1843 this Association, then four years old, submitted a memorial to Congress severely criticising the census statistics of 1840. Is it the function of this Association to revive or continue what may be termed high-grade lobbying practices with regard to the development of public service statistics in the future?

It seems to me that the answer to this question should be a negative, at least until our membership feel more strongly that the Association should enter polemic fields to influence the progress of statistical work in lines of public service activity. This need not prevent the Association, however, from entering dignified protest, through the regular officials or through standing or special committees, whenever it is deemed essential. For example, if a public service commission should be issuing grossly inaccurate or distinctly unfair statistics, it appeals to me the machinery of this Association could not be better employed than in creating a sentiment of disapproval among statisticians and in preparing formal protest to be lodged with the proper authorities.

The functions of the individual members of the Association, moreover, should be exercised in the way of assisting the progress of statistical work wherever they come into contact with it. If they see opportunity for suggestion or kindly criticism at any point, it is their duty to seize the opportunity. If they have views as to the proper lines along which public service statistics should be developed, they may well devote their energies to that development. If their sentiment leans toward curtailment, that certainly is their field of effort. In any case, they can and should devote their heartiest efforts toward improving public service statistics of all kinds, making them more accurate, more nearly complete, more illuminating, and in every way more serviceable.